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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,804	01/30/2006	David Ziger	US03 0244 US2	8019
65913	7590	02/24/2009	EXAMINER	
NXP, B.V. NXP INTELLECTUAL PROPERTY DEPARTMENT M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131			JELSMA, JONATHAN G	
			ART UNIT	PAPER NUMBER
			1795	
			NOTIFICATION DATE	DELIVERY MODE
			02/24/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No. 10/566,804	Applicant(s) ZIGER ET AL.	
	Examiner Jonathan Jelsma	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 21 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 7-16 is/are rejected.
- 7) ☒ Claim(s) 4-6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Summary

1. This is the second office action based on application 10/566,804 and in response to Applicant's Arguments/Remarks filed 11/21/2008.
2. Claims 1-13 are previously pending. Of those claims, claims 1-2, and 7-8 are amended, and claims 14-16 are new. Claims 1-16 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by BOWES (US 2002/0182516 A1).
5. BOWES teaches a mask set 1000A and 1000B comprising a dark field mask, 1000A, and a clear field mask, 1000B (Fig. 10). The dark field mask may comprise a first part of a pattern, 1002 (Fig. 10), these patterns are needle patterns used to determine line width due to the effects of aberrations, such as flare (paragraph 0036). The dark field mask includes a first portion of a box-in-a-box correction pattern, 104 (Fig. 10), and a first portion of an analogous focus box pattern, 106 (Fig. 10). The clear field mask, 1000B, has the complementary, and align able, box-in-a-box and focus box

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patterns, as well as the complementary portions of the flare patterns (Fig. 10). The combined first mask 1000A and second mask 1000B may be on a single mask 1000 (Fig. 10).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over KI (US 2003/0068565 A1) in view of BOWES (US 2002/0182516 A1).

9. Ki teaches a method of determining the effect of flare on the line widths of photoresist patterns (paragraph 0024). The line widths of photoresist patterns formed by a line and space pattern of a dark field mask are compared with the line widths of a clear field mask (paragraph 0024). The amount of flare is calculated based on the difference between the dark field and the clear field mask photoresist patterns

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(paragraph 0024). A first mask comprising a light shielding layer with light transmission patterns, where the line widths of the line patterns are the same, goes through a first photolithographic process, using an exposure apparatus (paragraphs 0047 – 0049). The first mask is then disposed above a wafer coated with a photoresist, and the first photolithographic process is performed (paragraph 0049). A second mask, which comprises a clear field mask, has light transmission region, with light shielding regions forming the pattern (paragraph 0054). A second photolithographic process is performed using the second mask, by projecting the image of the second mask onto a photoresist coated wafer, which may be the same wafer as used during the first exposure (paragraph 0056). The exposed portions of both the first photoresist pattern and the second photoresist patterns are developed and measured (paragraphs 0050 – 0051, and 0057-0058). The measurement may be done using a scanning electron microscope (paragraph 0057). The difference in line widths of the first and second photoresist patterns are determined, and the difference is the result of flare (paragraph 0058). The effect of flare may be determined using for example a computer program (paragraph 0060). Additionally as can be seen in Figure 6 the second mask pattern may be a composite pattern, including both clear field and dark field mask pattern regions. As can be seen in Figure 13, the pattern regions of the second mask, may be located in the corners of the main mask area.

10. Ki does not explicitly teach forming on the first mask the mask pattern being in the corner, or that the second mask has the pattern in the opposite corner. However, Ki does teach that the design of the patterns may be such, that the patterns are located in

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the areas where flare is measured (paragraph 0083). Therefore, at the time of the invention one having ordinary skill in the art would have been motivated to arrange the mask patterns in suitable locations, such as opposite relative corners, as a matter of routine experimentation, in order to design the mask so that the flare measurement patterns are located in the proper area to measure the flare.

11. Additionally Ki does not explicitly teach the first and second exposure in one die position, and the composite pattern exposure in a second die position. Ki does teach that the second exposure may be done on the same wafer, which may be interpreted as the same die position, and also that a new test wafer may be used, where the second test wafer may correspond to a second die position (paragraph 0056). At the time of the invention one having ordinary skill in the art would have been motivated utilize the first and second wafers, as different die positions during the exposures as a matter of routine experimentation, since KI teaches both the use of one wafer, and two wafers for the exposure.

12. Ki does not explicitly teach the first pattern contains a correction box or a focus box pattern. However, BOWES teaches a first portion of a box-in-a-box correction pattern, 104 (Fig. 10), and a first portion of an analogous focus box pattern, 106 (Fig. 10).

13. At the time of the invention one having ordinary skill in the art would have been motivated to include the box-in-a-box and focus box patterns of BOWES in the mask and method of KI, so that both the measurements of the pattern, and measurement of

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the alignment of the patterns may be determined in the same step (BOWES paragraph 0017).

14. KI does not explicitly teach that the measurements include measurements in both the X and Y directions. Specifically KI teaches the measurement of line widths (paragraph 0024).

15. BOWES however, teaches additionally teaches measuring a pattern for effects of line shortening (paragraph 0036).

16. At the time of the invention one having ordinary skill in the art would have been motivated to include the method of measuring a pattern for line shortening as taught by BOWES, as well as line width as taught by KI, because BOWES teaches that lens aberrations may also cause errors in line shortening.

17. Claims 7- 11, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ki (US 2003/0068565 A1).

18. KI teaches a method of determining the effect of flare on the line widths of photoresist patterns (paragraph 0024). The line widths of photoresist patterns formed by a line and space pattern of a dark field mask are compared with the line widths of a clear field mask (paragraph 0024). The amount of flare is calculated based on the difference between the dark field and the clear field mask photoresist patterns (paragraph 0024). A first mask comprising a light shielding layer with light transmission patterns, where the line widths of the line patterns are the same, goes through a first photolithographic process, using an exposure apparatus (paragraphs 0047 – 0049).

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The first mask is then disposed above a wafer coated with a photoresist, and the first photolithographic process is performed (paragraph 0049). A second mask, which comprises a clear field mask, has light transmission region, with light shielding regions forming the pattern (paragraph 0054). A second photolithographic process is performed using the second mask, by projecting the image of the second mask onto a photoresist coated wafer, which may be the same wafer as used during the first exposure (paragraph 0056). The exposed portions of both the first photoresist pattern and the second photoresist patterns are developed and measured (paragraphs 0050 – 0051, and 0057-0058). The measurement may be done using a scanning electron microscope (paragraph 0057). The difference in line widths of the first and second photoresist patterns are determined, and the difference is the result of flare (paragraph 0058). The effect of flare may be determined using for example a computer program (paragraph 0060). Additionally as can be seen in Figure 6 the second mask pattern may be a composite pattern, including both clear field and dark field mask pattern regions. As can be seen in Figure 13, the pattern regions of the second mask, may be located in the corners of the main mask area.

19. KI does not explicitly teach forming on the first mask the mask pattern being in the corner, or that the second mask has the pattern in the opposite corner. However, KI does teach that the design of the patterns may be such, that the patterns are located in the areas where flare is measured (paragraph 0083). Therefore, at the time of the invention one having ordinary skill in the art would have been motivated to arrange the mask patterns in suitable locations, such as opposite relative corners, as a matter of

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routine experimentation, in order to design the mask so that the flare measurement patterns are located in the proper area to measure the flare.

20. Additionally KI does not explicitly teach the first and second exposure in one die position, and the composite pattern exposure in a second die position. KI does teach that the second exposure may be done on the same wafer, which may be interpreted as the same die position, and also that a new test wafer may be used, where the second test wafer may correspond to a second die position (paragraph 0056). At the time of the invention one having ordinary skill in the art would have been motivated utilize the first and second wafers, as different die positions during the exposures as a matter of routine experimentation, since KI teaches both the use of one wafer, and two wafers for the exposure.

21. KI does not explicitly teach that the measurements include measurements in both the X and Y directions. Specifically KI teaches the measurement of line widths (paragraph 0024).

22. BOWES however, teaches additionally teaches measuring a pattern for effects of line shortening (paragraph 0036).

23. At the time of the invention one having ordinary skill in the art would have been motivated to include the method of measuring a pattern for line shortening as taught by BOWES, as well as line width as taught by KI, because BOWES teaches that lens aberrations may also cause errors in line shortening.

Allowable Subject Matter

24. Claims 4-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

25. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not teach or suggest that the effect of flare is calculated in an X-direction for the difference between a right leg and a left leg, and from the Y-direction for the effect of flare from a top leg and bottom leg of the printed feature.

Response to Arguments

26. Applicant's arguments, see page 6 paragraph 2 of Applicant's Arguments/Remarks, filed 11/21/2008, with respect to objection to the drawings have been fully considered and are persuasive. The objection of the drawings has been withdrawn. The newly submitted drawings filed 11/21/2008 have overcome the rejection to the drawings.

27. Applicant's arguments, see page 6 paragraph 3 of Applicant's Arguments/Remarks, filed 11/21/2008, with respect to 35 U.S.C. 112 2nd paragraph rejection of claims 1-10 have been fully considered and are persuasive. The 35 U.S.C. 112 2nd paragraph rejection of claims 1-10 has been withdrawn. The amendment to the claims has overcome the rejection.

28. Applicant's arguments filed 11/21/2008 have been fully considered but they are not persuasive.

29. Argument 1: On page 6, fourth paragraph of Applicant's Arguments/Remarks, Applicant argues that BOWES does not teach or mention flare, or measuring or accounting for the effects of flare. Additionally Applicant argues that BOWES instead teaches focal-related adjustments, which is not the same as flare. This argument is not persuasive.

30. Examiner notes that claims 12-13 are structure claims, comprising a mask set for use in a wafer stepper. Therefore, arguments that the prior art does not teach limitations related to the method of using the masks, such as measuring or accounting for the effects of flare are non persuasive since they relate to unclaimed subject matter. At most, the present claims recite an intended use for the mask patterns, by defining them as flare patterns. In comparison the present application's specification defines flare as a type of lens aberrations (page 3 lines 1-3), and that one of the effects of flare is line shortening (page 3 lines 9-10). Similarly BOWES's patterns are also used for determining lens aberrations such as line shortening (paragraph 0036). Therefore, even though BOWES may focus on focus related lens aberrations apposed to those of flare, BOWES patterns may be used for flare, since they also are used to detect line shortening.

31. Argument 2: On page 7 paragraphs 1-2, and page 8 paragraph 1 of Applicant's Arguments/Remarks, Applicant argues that the rejection is based on alternative

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processes in the teachings of KI, that have been combined to teach an alternative process. This argument is not persuasive.

32. While examiner does pull from an additional embodiment of the KI reference in order to support the rejection, it is done with a proper 103 prima facie case of obviousness. For example, KI does not explicitly teach forming on the first mask (the previously cited embodiment) the mask pattern being in the corner, or that the second mask has the pattern in the opposite corner. The examiner then draws upon a different embodiment of KI that teaches forming the patterns located in corners of the mask (paragraph 0083), and then explains that KI teaches the underlying teachings of placing the flare patterns on the mask design in order to be in a location where flare is to be measured (paragraph 0083). Therefore, one having ordinary skill in the art would have been motivated by routine experimentation, of determining the locations of where flare is occurring, and or needs to be measured, to place the flare patterns in those locations, which may include opposite corners, in order to design the mask so that it is measuring flare at the proper location.

33. Argument 3: On page 8 paragraph 2 Applicant argues that the proposed changes of KI would undermine the purpose and implementation of the teachings of KI, and therefore teaches away. Specifically that the proposed modification of KI would replace the test patterns and/or test wafers. This argument is not persuasive.

34. The proposed modifications of KI would not replace the test patterns and/or test wafers. Instead the modification would merely be in the placement of the same mask design of KI, so that the flare patterns of KI may be in the desired (in this case opposite

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corners) location to test the flare as taught by KI (paragraph 0083). Therefore, examiner believes that the proposed modifications of KI would have been obvious at the time of the invention, and would not teach away.

Conclusion

35. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

36. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Jelsma whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 7:00 a.m. - 5:00 p.m.

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38. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

39. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/

Supervisory Patent Examiner, Art Unit 1795

JGJ